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Federal Aviation
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Report to Congress

Potential Hazards to Aircraft By Locating Waste Disposal Sites in the Vicinity of Airports

Washington, D.C. 20591 April 1996

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Report of
the Secretary of Transportation
to the United States Congress
Pursuant to Section 203 of the Airport
and Airway Safety, Capacity, Noise
Improvement, and Intermodal
Transportation Act of 1992 (P.L. 102-581)

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16. Abstract

This report was developed from historical data, past studies, and research on the incidents and accidents involving bird strikes and aircraft and on the potential of solid wste disposal sites to attract and sustain bird movements.

This report is in response to Section 203(b)(2) of the Airport and Airway Safety, Capacity, Noise Improvement, and Intermodal Transportation Act of 1992. This section directed a study to be conducted to determine whether a municipal solid waste facility, located within a 5-mile radius of the end of a runway, has the potential for attracting or sustaining bird movements (from feeding, watering, or roosting in the area) and poses a hazard to runways or approach and departure patterns of aircraft.

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THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

April 1, 1996

The Honorable Albert Gore, Jr.
President of the Senate
Washington, DC 20510

Dear Mr. President:

The enclosed report is provided in response to Section 203(b)(2) of the Airport and Airway Safety, Capacity, Noise Improvement, and Intermodal Transportation Act of 1992. This section directs the Secretary of Transportation to conduct a study to determine whether a municipal solid waste facility, located within a 5-mile radius of the end of runway, has the potential for attracting or sustaining bird movements (from feeding, watering, or roosting in the area) and poses a hazard to runways or approach and departure patterns of aircraft.

An identical letter has been sent to the Speaker of the House of Representatives.

Sincerely,

Federico Peña

Enclosure

REPORT ON THE POTENTIAL HAZARDS TO AIRCRAFT BY LOCATING WASTE DISPOSAL SITES IN THE VICINITY OF AIRPORTS

PURPOSE

This report is submitted to Congress in response to Section 203(b)(2) of the Airport and Airway Safety, Capacity, Noise Improvement, and Intermodal Transportation Act of 1992 which directs the Secretary of Transportation to conduct a study to determine whether a municipal solid waste facility, located within a 5-mile radius of the end of a runway, has the potential for attracting or sustaining bird movements (from feeding, watering, or roosting in the area) and poses a hazard to runways or approach and departure patterns of aircraft.

SCOPE OF REPORT

Because most wildlife movements are seasonally influenced, a complete study of the issues presented would require that researchers document all wildlife activity for at least 1 year. In order to produce more credible information, at least 3 years of study data would be necessary to calculate valid statistical averages. Given the limited timeframe specified in the Act for completing this study, it was not considered feasible to formulate and carry out a fully scientific research project to address the issue of siting landfills near airports. Instead, this report was developed from historical data, past studies, and

research on the incidents and accidents involving bird strikes and aircraft and on the potential of solid waste disposal sites to attract and sustain bird movements.

AIRCRAFT BIRD STRIKES HISTORICAL BACKGROUND

It is generally agreed that birds and aircraft are not compatible even though they share the common thread of flight. Bird strikes with aircraft were recorded as early as 1912, when a Wright Flyer crashed after striking a bird off the Pacific coast. Calbraith Rodgers, the pilot who drowned in the crash, became the first aviation fatality attributed to a bird strike.

Developments over the last 80 years have brought aviation to unprecedented levels of sophistication. However, this increased level of sophistication has not provided aircraft with an immunity to damages resulting from strikes with wildlife. Modern aircraft carry more passengers at greater speeds than ever before, thus increasing the potential for catastrophe. At high speed, even small animals become damaging projectiles to large aircraft. According to V.F.E. Soloman, a noted Canadian bird hazard specialist, a 4-pound bird struck at 260 knots exerts a force of 14 tons; at 520 knots, the force becomes 57 tons.

Bird strikes have been responsible for more than 100 deaths in the United States. Some of the more notable accidents that were attributed to bird strikes included:

On October 4, 1960, a Lockheed Electra departing Boston's Logan Airport struck starlings and crashed, resulting in 62 deaths.

In 1973, a Learjet departing Dekalb-Peachtree Airport in Georgia struck a flock of cowbirds (small blackbirds) and ingested them into the engines. Both engines sustained compressor stalls, causing the aircraft to crash, killing all seven on board.

On November 12, 1975, a DC-10 departing John F. Kennedy Airport caught fire on takeoff and was completely destroyed. The accident resulted in a number of injuries, but no deaths. Fortunately, the 139 passengers, who were airline employees, were able to evacuate the burning aircraft quickly. The National Transportation Safety Board determined that the probable cause of the accident was the disintegration and subsequent fire in the No. 3 engine when it ingested a large number of gulls.

In 1988, in Bahar Dar, Ethiopia, a Boeing-737 on takeoff struck a flock of speckled pigeons and crashed, killing 35 passengers and injuring 21 others.

On June 18, 1994, the pilot of a Cessna 441 Conquest lost control of the aircraft during takeoff from Fort France, Ontario Airport when the left engine lost power as a result of gull ingestion. Based on the bird remains on the runway, the bird ingestion occurred after 1,600 feet of ground run. Hundred of gulls were observed at the Fort France garbage dump, located approximately 1 mile south of the airport.

On September 22, 1995, an Air Force AWACS crashed, killing all 24 on board, after ingesting 4 Canada geese into its no. 1 and 2 engines during takeoff from Elmendorf Air Force Base, Alaska. This was the first crash of an Airborne Warning and Control System plane since the Air Force began using them in 1977.

On September 26, 1995, a Cessna Citation struck 4 Canada geese on takeoff from Mackinac Island. Two geese were ingested into the right engine and 2 others struck the leading edge of the left wing. The pilot aborted the takeoff and stopped the plane thirty feet off the end of the runway.

On June 3, 1995, an Air France Concorde suffered at least $5 million damage when it caught fire after 2 of its 4 engines ingested a number of Canada geese during touch down at Kennedy International Airport. Flames and smoke were seen coming from the number 3 and 4 engines under the right wing.

Some of the reports that followed the incidents mentioned above noted that birds had been attracted by either waste disposal operations or by trash on or about the vicinity of the airport. Following the 1973 Learjet crash, the National Transportation Safety Board recommended that the Federal Aviation Administration (FAA) "implement a procedure for more stringent and continued surveillance of all facilities subject to the provisions of the Airport and Airway Development Act and impose timely sanctions against operators of facilities, which receive Federal aid and do not fully comply with the requirements imposed upon them by the provisions of this act." A provision in the Act specifies that grant recipients, to the extent reasonable, maintain compatible land uses around an airport.

Whether or not a catastrophe results, bird hazards can be responsible for unnecessary risk and expense. The FAA receives an average of 2,000 bird strike reports each year. This reporting system is voluntary and does not reflect the total number of strikes or cost estimates of damage to aircraft or the aviation industry. It is generally accepted that more than half of all strikes go unreported. Far less information is received on cost estimates. Information regarding the amount of damage is seldom reported because pilots normally fill out the strike report before the actual extent of damage is determined.

However, damage to aircraft from birds can be severe and costly. According to a recent Environmental Impact Statement (EIS) for John F. Kennedy International Airport, after ingesting 1 bird, a Boeing-747 aborted its takeoff, blew 10 tires, and damaged the brakes while stopping. The resulting damage from this one incident cost the airline $200,000. Additionally, the EIS reported that between 1979 and 1993, bird strikes caused 46 instances of engine damage, 22 instances of nonengine damage, and 51 aborted takeoffs (USDA 1994)[1].

LANDFILLS AS ATTRACTIONS TO BIRDS

A number of scientific papers have been published regarding the association of birds and waste disposal operations. It is generally accepted that large numbers of birds commonly frequent landfills in search of food. In a recent study conducted by the United States Department of Agriculture's Denver Wildlife Research Center (DWRC) for the FAA, 699,477 individual birds of 42 species were recorded at 3 landfills in 958 observation periods (Belant et al. 1994)[2]. Although gulls may be found at inland landfills, they are one of the more common bird species

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[1]Final Environmental Impact Statement, Gull Hazard Reduction Program, John F. Kennedy International Airport, United States Department of Agriculture, May 1994, pp. 1-7, 1-10.

[2]Jerrold L. Bellant et al., "Gull and Other Bird Abundance at Three Mixed Solid Waste Landfills in Northern Ohio," DOT Interim Report, DTFA01-91-Z-02004, (1992), p. 23.

associated with coastal landfills. Additionally, crows, starlings, blackbirds, pigeons, sparrows, and vultures have been documented as common visitors to most landfills regardless of the location (Lake 1984)[3].

Bird populations that impact human health and safety have been less understood and documented. However, in 1971 the Environmental Protection Agency (EPA) released a report that surveyed land disposal sites reporting bird aircraft hazards. In the discussion section on page 26 it stated, "there is little doubt that improper solid waste disposal sites in many areas of the country contribute to the bird/aircraft strike hazard at airports." Furthermore, it was stated in the summary and conclusions that, "analysis of judgments following two lawsuits resulting from aircraft/bird strike accidents indicated a strong possibility that both government and a disposal site owner could be liable for an accident attributed to birds if the disposal site was knowingly attracting birds and contributing to the risk of bird/aircraft collisions" (Davidson et al. 1971)[4].

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[3]David W. Lake, "Airport Bird Hazards Associated With Solid Waste Disposal Facilities," Proceedings: Wildlife Hazards to Aircraft Conference and Training Workshop, (1984), p. 221.

[4]George R. Davidson, Jr. et al., "Land Disposal Sites Near Airports Reporting Bird/Aircraft Hazards," Open-File Report, (TSR 1.6.004/0), U.S. Environmental Protection Agency, 1971, p. 2.

Considering the reports referenced above, FAA believes there is enough information available to support the conclusion that landfills are attractive to birds and that a potential hazard will exist whenever numbers of birds are drawn into or across air traffic corridors.

The FAA has initiated research to understand, identify, and manage potentially hazardous wildlife populations better on or near airports. Actual research is being completed under a contract with DWRC. DWRC is recognized as one of the most experienced organizations in the field of nuisance wildlife management. Although wildlife hazard research is currently underway, it remains in preliminary stages. This preliminary research will establish a solid data base that will be used for later comparisons.

More research is also needed to assess the effectiveness of wildlife control techniques. It is common for operators of waste disposal facilities to include wildlife control techniques in proposals to locate or expand operations in the vicinity of airports. These techniques include the use of pyrotechnic devices, broadcast bird distress calls, and as a last resort, lethal control. Although these controls are often presented as being sufficient to offset any wildlife attraction caused by the landfill activity, there is little documentation that these

controls will significantly mitigate the attractiveness of a landfill to birds over an extended period. Thus, there is no assurance that such efforts would actually alleviate a bird hazard near an airport should one arise after the landfill is constructed. There exists ample information regarding bird dependence on landfills. Conversely, there is little information documenting successful long-term mitigation of the problem.

LANDFILL SITING NEAR AIRPORTS

Locating a waste disposal site, particularly in and around urban areas, has become a very serious problem for most communities, from both physical and political viewpoints. As a result, there has been an increasing need to expand existing sites and establish new waste disposal facilities and landfills. A proposal to establish such a facility close to a populated or recreational area will, in most cases, result in considerable controversy and public opposition. Landfill proponents often consider or select sites located at the end of runways or in the vicinity of airports as solutions to these issues. These locations are often near, but outside, population centers; are noise-impacted or otherwise unattractive for building development; provide readily available and inexpensive land; and generally provide a location with good road access. As a result, these sites stand a much greater chance of being accepted by the public for landfill use. Because of its concern that the

attractiveness of these landfills to bird populations has a potential to impact the safety of aircraft operating to and from airports, the FAA has taken a number of actions and established policies and procedures to evaluate the impact of potential landfill sites adjacent to airports.

FEDERAL REGULATIONS, POLICIES, AND PROCEDURES

A. Federal Aviation Regulations Part 139. Airports which serve any scheduled or unscheduled passenger operation of an air carrier that is conducted with an aircraft having a seating capacity of more than 30 passengers are required by Federal Aviation Regulations Part 139 to have an airport operating certificate from the FAA. This certificate is only granted after the airport is inspected by an FAA airport certification inspector to ensure that all minimum safety standards of Part 139 have been met. Under Section 139.337, all operators of certificated airports shall provide for "the conduct of an ecological study, acceptable to the Administrator, when any of the following events occurs on or near the airport: (1) An air carrier aircraft experiences a multiple bird strike or engine ingestion; (2) An air carrier experiences a damaging collision with wildlife other than birds; and (3) Wildlife of a size or in numbers capable of causing an event described in paragraph (a) (1) or (2) of this section is observed to have access to any airport flight pattern or movement area." Based in part on this

study, FAA may require the airport operator to formulate and implement a wildlife hazard management plan.

B. Order 5200.5A, Waste Disposal Sites On Or Near Airports. FAA issued Order 5200.5 on October 16, 1974, to provide internal guidance regarding FAA's official position on siting landfills near airports in an effort to reduce potential airport/wildlife hazards. The current Order 5200.5A, Waste Disposal Sites On Or Near Airports, and the original Order 5200.5, contain criteria concerning the establishment, elimination, or monitoring of landfills, open dumps, waste disposal sites, or other similar facilities on or in the vicinity of airports. Orders, such as 5200.5A, are internal directives that provide guidance to FAA employees. Advisory circulars are public information and may be instructive to those who receive grants from the FAA. These orders and advisory circulars have no authority over facilities located off airport property. Also, FAA has no authority to approve or redirect land use outside the airport perimeter. For airports that receive Federal funds, the owner, operator, or grant recipient must comply with terms of the grant obligation to the extent reasonable to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations. However, in most cases landfills are located outside the airport property and are often beyond the airport owner's jurisdictional control.

FAA Order 5200.5A sets forth the policy that waste disposal sites are incompatible with aircraft operations when located within those areas adjacent to an airport that are defined through the application of the following three criteria: (1) when located within 10,000 feet of any runway end used or planned to be used by turbine-powered aircraft; (2) within 5,000 feet of any runway end used by piston-powered aircraft; and (3) when located within a 5-mile radius of a runway end, such that it attracts or sustains hazardous bird movements from feeding, watering, or roosting areas into or across the runways and/or approach and departure paths of aircraft. Although frequent movements of birds across aircraft approach and departure paths could be a safety concern beyond the 5-mile radius, this distance was considered a reasonable limit for application of the FAA criteria. The earlier version of the FAA order had no such limit.

C. FAA Notification Requirements. To assist FAA in its ability to monitor the siting of landfills near airports, Congress in 1992 enacted legislation to amend the Federal Aviation Act to allow the Secretary of Transportation to require that persons proposing to establish sanitary landfills notify the Secretary when such notice will promote safety and the efficient use or preservation of navigable airspace. A proposed FAA regulatory amendment will establish an area within a 5-mile radius from an airport for requiring such a notification.

D. EPA Notification Requirements. Because of safety concerns and a lack of jurisdiction, FAA actively sought the assistance of the EPA to consider airport safety concerns when processing landfill siting permits. FAA suggested that the criteria in Order 5200.5A be incorporated into EPA's revision of its solid waste disposal regulations. As a result of FAA comments, the EPA adopted a regulatory requirement in the Solid Waste Disposal Facility Criteria, 40 Code of Federal Regulations Section 258.10, that landfill owners or operators notify the affected airport and appropriate FAA office whenever they intend to expand or propose a new landfill within 5 miles of an airport. However, EPA chose not to prohibit landfill operations within the 5,000 and 10,000 foot distance criteria identified by FAA. Instead, it required operators within these areas to demonstrate to the State agency having the authority to issue the permit that the operation does not pose a bird hazard to aircraft.

BASIS OF FAA CRITERIA FOR SITING OF LANDFILLS

FAA believes that any open household or putrescible waste disposal activity within 5,000 feet of a runway serving piston-powered aircraft and 10,000 feet from a runway serving turbine-powered aircraft is incompatible with safe aircraft operations. Outside this criteria but within 5 miles of the runway edge, FAA will review proposed landfill locations on a case-by-case basis.

Under these circumstances, if the site falls directly under the approach or departure path or has the potential to increase birds in the active airspace, FAA will generally consider the site as being incompatible with the airport. If the site were located between the 10,000-foot limit and the 5-mile limit away from the approach or departure path and would not likely attract birds across the active airspace, FAA will not consider the site incompatible. During this case-by-case evaluation, factors such as the native bird populations, local geography, and the airport traffic patterns are considered.

The distance used in FAA's guidance is based on several factors. Bird strikes are voluntarily reported to FAA from ground level to several thousand feet above ground level (AGL). Most bird strikes occur below 500 feet with numbers diminishing to insignificant levels above 3,000 feet. Based on normal performance characteristics, departing aircraft should be at approximately 500 feet AGL after traveling 10,000 feet from the runway end and approaching 3,000 feet AGL at 5 miles. These distances and altitudes form the basis for the minimum criteria designated for a turbine-powered aircraft.

Criteria for piston-powered aircraft specifies a lesser distance of 5,000 feet due to different performance characteristics. These aircraft are slower and make more noise relative to a bird's ability to respond. The engine noise and slower airspeed

allow the operator and bird more time to react and avoid striking each other. Additionally, piston-powered aircraft do not have engine intakes that can ingest birds.

The 5-mile area is specified in Order 5200.5A to allow FAA the opportunity to review the traffic patterns, geography, and juxtaposition of the proposed landfill site and airport. As birds do not respect minimum distances, this review provides FAA an early opportunity to comment on proposed disposal sites in critical air traffic areas immediately outside the 5,000 and 10,000 foot zones. The review also takes into account existing numbers of birds in the area and other natural, man-made, or geographical features such as refuges, water reservoirs, or coastlines that may be located across air traffic paths from the proposed disposal site. As a note of reference, the 5-mile radius is also used in other countries, such as Canada, which restricts landfill development within 8 kilometers, or 4.8 miles of an airport reference point.

FUTURE CONCERNS

There are indications that bird species with the greatest potential to create wildlife hazards on airports are increasing and that future resolutions to these hazards may become more complex. Certain species that frequent landfills, such as ring-billed gulls, are increasing in unprecedented numbers. At the

same time, the public is becoming more involved in wildlife management issues. The National Environmental Policy Act may require public involvement in the solution of a wildlife-related airport safety problem. The public's involvement may be costly and time consuming, resulting in a trade-off of accepting potential hazards while possible solutions are debated.

The likelihood of bird strikes may be further exacerbated by design changes to modern aircraft, which incorporate larger inlet engines to achieve reduced noise levels. These larger, quieter engines give birds less warning and require them to avoid a larger surface area.

FINDINGS

1. FAA believes that current data is insufficient to permit an accurate and consistent quantification of the risk created by locating landfills within 5 miles of an airport. Although a quantified risk assessment is not available, the potential hazard of bird strikes has been established in reports following aircraft accidents.

2. FAA believes that landfills constitute a potential hazard to aviation if located within 5 miles from a runway end for the following reasons:

a. Bird strikes in the vicinity of waste disposal activities located within 5 miles of an airport have been a factor in numerous accidents, some involving loss of human life.

b. Bird activity is generally recognized to occur at altitudes that brings it into the path of aircraft during approach and departure operations, the most critical time for aircraft performance.

c. Modern aircraft, with quieter engines and larger engine inlets, increase the potential for bird strikes due to the reduced warning resulting from quieter engines with greater frontal areas which combine to increase the chances of birds being struck or ingested.

d. Bird mitigation techniques, although offered as a solution, have not been proven effective over extended periods of time. In addition, future mitigation programs will become more complicated and require more time to implement, resulting in a trade-off of potential hazards.

e. Landfills are intense attractants to birds. When located in or adjacent to airspace used by aircraft, a potential hazard will result.

3. As total bird control is not possible, the best solution is to restrict actions on or in the vicinity of an active airport to reduce bird attractions.

4. The distance criteria contained in FAA Order 5200.5A serve as a reasonable basis for determining the incompatibility of a landfill site with airport operations.

PUBLIC COMMENTS

The report to Congress was published in the Federal Register (Vol. 60, No. 101, Thursday, May 25, 1995) to obtain public comment. The FAA received 20 comments. The comments received fall into two distinct groups: those that believe the FAA guidelines are arbitrary, based on outdated data, and are too restrictive (mainly from those associated with the waste disposal industry) and those that believe the guidelines are logical, based on scientific fact, and protect the flying public (mainly from those associated with the air transportation industry). No one questioned the basic premise that putrescible-waste landfills attract birds that can pose a threat to aircraft safety.

Opponents of the guidelines argued that FAA has not developed any new data to support its contentions that landfills cannot be safely sited near airports and that potential problems cannot be indefinitely mitigated through control measures. Several commenters noted that FAA is not flexible with regard to locating landfills within 5,000 feet of a runway serving piston-powered aircraft and 10,000 feet of a runway serving turbine-powered aircraft. These commenters encouraged FAA to consider factors

such as the size of the airport, the size of aircraft using the airport, the size of the landfill, the number of aircraft operations, maintenance practices at the landfill, and mitigation measures; proposing each case should be judged on its individual merits, and not with a "one rule fits all" solution.

In general, proponents of the guidelines believed them to be satisfactory or not restrictive enough. Many stated that putrescible-waste landfill should not be allowed within 5 miles, or more, of an airport. They urged FAA to expand its definition of incompatible land uses to include not only putrescible-waste landfills, but any land-use practice that creates a potential wildlife/aircraft strike hazard. Opposition was expressed to case-by-case adjudication. One airport operator maintained that FAA should seek regulatory or legislative authority prohibiting all landfills within 5 miles of any runway. The commenter goes on to say, "The landfill operator will provide a study which shows the landfill does not attract birds, but FAA will go on record as opposing the landfill." This places the airport operator in a "Catch 22" situation with FAA opposing and local government encouraging the landfill. Legislative action, according to the commenter, would prevent this.

CONCLUSIONS

There is no dispute over the fact that putrescible-waste landfills attract birds that may pose a threat to aircraft safety. FAA is compelled to maintain its current policy which requires the consideration of several factors to determine if a particular land-use is compatible with aircraft safety. The location of putrescible-waste landfills within 5,000 feet of a

runway serving piston-powered aircraft, 10,000 feet of a runway serving turbine-powered aircraft, or in the approach or departure area within 5 miles of an airport may create a wildlife/aircraft strike hazard. The presence of these conditions would make the proposed land-use practice incompatible with safe aircraft operations and result in unsafe conditions for aircraft.

Although this policy does not provide for all airport-related wildlife hazards, locating intense wildlife attractants, such as putrescible-waste landfills outside the areas specified, will reduce the risk of a wildlife/aircraft collision. While this policy does not provide for exceptions, FAA believes it is more prudent to err on the side of safety.

FAA intends to continue collecting more information and scientific data on the issue of wildlife/aircraft strike hazard management. The agency recognizes the importance of working closely with the waste disposal industry and the scientific community to seek better solutions to mutual concerns, and it will continue to do so.

Progress has been made toward this goal by the FAA and EPA. EPA requires that operators of existing municipal solid waste landfills, within the specified airport areas, demonstrate to the State agency that issues municipal solid waste permits that such facilities do not pose a bird hazard to aircraft. Additionally, proponents of new or expanded landfill sites within 5 miles of an airport must notify the affected airport and the FAA of their intentions.

Recent FAA-sponsored research has shown that non-putrescible-waste landfills (i.e., construction and demolition landfills, fly-ash landfills), yard-waste composting facilities, and enclosed trash-transfer stations generally do not attract wildlife that could create a wildlife/aircraft strike hazard. FAA does not generally consider non-putrescible waste landfills, yard-waste composting, and enclosed trash transfer stations to be hazardous to aviation if there is no apparent attraction to wildlife and assurances are in place to deal effectively with any wildlife-related hazards to aviation that may arise. FAA will continue to reassess its position as new data becomes available.

FAA is committed to maintaining effective communication with the scientific community and the waste disposal industry, and it plans to continue a dialogue with these parties in order to reach mutually satisfactory solutions to waste management problems.

FAA will continue to support waste management and human/wildlife conflict resolution research directed toward improving aviation safety.